GENERAL NOTES

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PARASITISM OF NEW ENGLAND BUCKMOTH CATERPILLARS (*HEMILEUCA LUCINA*: SATURNIIDAE) BY TACHINID FLIES

Additional key words: *Compsilura concinnata*, defense, gregarious, *Hyposoter fugitivus*.

We report here the interactions of larvae of *Hemileuca lucina* Hy. Edw. (Saturniidae) and tachinid parasitoids (Diptera: Tachinidae) and the resulting level of parasitism of aggregated versus solitary larvae at Leverett (Franklin Co.), Massachusetts in 1985. On 2 June, tachinid flies were observed attacking three aggregations of third instar *H. lucina* larvae feeding on *Spiraea latifolia* Ait. Bork (Rosaceae). One fly was attacking each aggregation. Although in some instances the flies were able to land on the larvae, walk on them and probe with the ovipositor, in many cases the larvae began thrashing as the flies (either flying or walking) approached within 2.5 cm. Once the larvae began thrashing, the flies retreated to nearby branches (<15 cm away) and periodically resumed attacking the larvae. Larvae in two of the aggregations being attacked were in the process of molting. The third group of (non-molting) larvae was attacked repeatedly by a fly during the two-hour observation period and consequently fed little.

Attacks were also observed on 7 June, and larvae collected then were reared to identify the parasitoids. In addition, to determine the level of parasitism at the site, 234 fourth instar larvae were collected and reared to pupation. During collection, some larvae were found aggregated. Others were solitary, which can occur: 1) throughout the larval period but is most frequent in the later instars as aggregation tendency declines (Cornell, J. C., N. E. Stamp & M. D. Bowers 1987, Behav. Ecol. Sociobiol. 20:383–388) and 2) when predators trigger escape behaviors after which the larvae fail to re-aggregate (Stamp, N. E. & M. D. Bowers 1988, Oecologia 75:619–624). Of the 49 larvae that were found at least 20 cm from other individuals and 50 cm or more from aggregations, 53% were parasitized. In contrast, of the 185 larvae in groups, with mean group size of 10 ($\pm$4 SD, n = 18), only 26% were parasitized. That the solitary larvae more frequently contained parasites ($\chi^2 = 11.95$, $P < 0.001$) may mean that: 1) solitary larvae are more vulnerable to the flies; 2) larvae attacked by the flies are more likely to drop to the ground, an escape behavior exhibited by these larvae, and then fail to rejoin an aggregation; and/or 3) parasitized larvae have less of an aggregation tendency than unparasitized larvae.

The majority of the parasitism was due to the tachinid fly *Compsilura concinnata* (Mg.) (identified by Monty Wood, Biostematics Research Institute, Ottawa, Ontario). This parasitoid deposits live larvae into its hosts (Clausen, C. P. 1940, Entomophagous insects, McGraw-Hill, New York–London, 688 pp.). It was introduced for biological control of gypsy moths, but it has been recorded from about 200 species (Clausen, C. P. 1956, Biological control of insect pests in the continental United States, U.S.D.A. Tech. Bull. 1139, 151 pp.).

Three of the larvae from groups were parasitized by an ichneumonid wasp *Hyposoter fugitivus* (Say) (Hymenoptera: Ichneumonidae) (identified by Scott Shaw, Univ. of Wyoming). This parasitoid is also a generalist and has been reported from *Hemileuca maia* (Drury) (Carlson, R. W. 1979, Ichneumonidae, p. 677 *in* Krombein, K. V., P. D. Hurd, Jr., D. R. Smith & B. D. Burks (eds.), Catalog of Hymenoptera in America north of Mexico, Smithsonian Inst., Washington, D.C., 1198 pp.).

We also observed the behavior of the tachinid flies attacking third and fourth instar *H. lucina* larvae in screened cages (60 × 60 × 80 cm length) in the laboratory. These flies had emerged from *H. lucina* larvae in the laboratory. After discovering the larval aggregation, the flies perched on nearby leaves or branches before attacking. Not all fly attacks resulted in contact with a larva. When a fly disturbed the larvae, the entire

aggregation often began thrashing for up to 20 min and that often appeared to prevent fly contact with the larvae. As noted in field observations, some larvae attacked by the flies immediately dropped to the ground.

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URBAN BIOLOGY OF *LEPTOTES MARINA* (REAKIRT) (LYCAENIDAE)

Additional key words: *Plumbago auriculata*, myrmecophily, predators, parasitoids, ecology.

Leptotes marina (Reakirt) is a widespread lycaenid butterfly, ranging from southwestern United States to northern Central America. Ecologically versatile, it occurs in a wide range of habitats from xeric deserts to coniferous forests or tropical lowlands. As early as the 1920s, *L. marina* had become a common backyard species in southern California; J. A. Comstock (1930:177, Butterflies of California, published by the author, Los Angeles, 334 pp.) reported the ornamental *Wisteria* (Fabaceae) as the larval host in these situations. Since that time, *L. marina* has become increasingly urbanized. Although larvae feed on Fabaceae in native situations, the primary host in urban environments today is the perennial Cape Plumago (*Plumbago auriculata* Lam.; Plumbaginaceae), a bush introduced from South Africa and used widely as a garden ornamental and in freeway landscaping. In contrast to the spring blooming *Wisteria*, *P. auriculata* may bloom year round, providing larval resources throughout the year.

An urban site approximately 2.5 km east of Imperial Beach, San Diego County, California, harbors a large population of *L. marina*, and this locality was the source of the following observations.

Eggs are laid singly on the calyx and developing buds of *P. auriculata*. The young larva bores a hole into the bud near the base, where it feeds primarily on plant reproductive tissue. Later instars may devour nearly the entire bud or developing seeds. Flower petals are eaten rarely; larvae were never observed to feed on foliage. A single bush of *P. auriculata* may support a substantial population of the butterfly without exhibiting noticeable damage from larval feeding. The butterfly appears to be continually brooded. Although adults may be taken throughout the year, population density is conspicuously depressed from December to February or March in most years.

All larvae observed in the field (n = 15) were closely associated with Argentine ants [*Iridomyrmex humilis* (Mayr); Hymenoptera: Formicidae]; ants were either on or within a centimeter of larvae. Larvae were never observed in the absence of ants; three to five ants on a single inflorescence always indicated the presence of one or more larvae. Larvae reared in the laboratory in cardboard cartons at ambient temperature developed normally in the absence of ants. As reported previously for *L. marina* and for many other lycaenids (Ballmer, G. & G. Pratt 1989, J. Res. Lepid. 27:1–81), larval coloration and markings are extremely variable. Of 20 larvae brought into the laboratory, 3 produced single braconid parasitoids (*Cotesia* sp.; Hymenoptera: Braconidae: Microgastrinae) that pupated in silken white cocoons attached either to the host material or to the paper-towel substrate. In the